Attorney Docket No.: 944-1.56
Serial No.: 10/016,499

In the claims: Please change the claims as indicated.

1. (Currently amended) A method for determining information about ~~the carrier~~ a carrier frequency of a signal transmitted by a possibly moving transmitter, the signal having a code component and a carrier component at the carrier frequency, the method comprising:

a) a step (100) of responding to successive approximately carrier-demodulated received signal fragments (102), and providing a set (104) of correlation results indicating information about the correlation of the successive approximately carrier-demodulated received signal fragments with ~~a replica~~ phase-shifted replicas of the code component and any remaining carrier component, wherein the ~~set (104) is~~ successive approximately carrier-demodulated received signal fragments are formed using different possible offsets from a nominal carrier frequency ~~used to approximately carrier-demodulate the received signal fragment~~, and further wherein each element of the set (104) is provided as a phasor ($c_{p,m}$) having a magnitude and a phase; and

b) a step (106) of responding to the set (104) of phasors, selecting the phasor ($c_{p,m}$) having a magnitude distinguishing it from all the other elements ($c_{p,m}$) of the set (104), and determining the phase of the selected phasor.

2. (Currently amended) A method as in claim 1, wherein the set (104) of correlation results is a matrix of correlation results, and further wherein the matrix of correlation results is spanned by an index (m) indicating an offset from a nominal carrier frequency and also by an index (p) indicating a replica code phase, and still further wherein the selected phasor ($c_{p,m}$) is the phasor having the maximum magnitude of all the elements of the set (104).

3. (Currently amended) A method as in claim 2, wherein the step

(100) of providing the matrix of correlation results includes a step (11) of performing a coherent integration of each of a series of received signal fragments, and a step (12) of performing a non-coherent integration in which ~~the~~ phasor results of the coherent integrations are combined without regard to phase.

4. (Original) A method as in claim 3, wherein the step (12) of performing the non-coherent integration involves multiplying each element of a matrix of correlation results provided using a coherent integration of a first signal fragment, by the complex conjugate of a corresponding element for an immediately preceding signal fragment.

5. (Original) A method as in claim 2, wherein in providing the matrix of correlation results as phasor values ($c_{p,m}$) and in determining the phase of the phasor having the maximum magnitude of all the elements of the matrix, only at most two phasor values ($c_{p,m}$) are held in a memory device at any instant of time, and of the two phasor values, only the phasor value ($c_{p,m}$) having the larger magnitude is saved in the memory device before calculating a next phasor value ($c_{p,m}$).

6. (Currently amended) An apparatus (23) for determining information about ~~the carrier~~ a carrier frequency of a signal transmitted by a possibly moving transmitter, the signal having a code component and a carrier component at the carrier frequency, the apparatus comprising:

a) means (300), responsive to successive approximately carrier-demodulated received signal fragments (302), for providing a set (304) of correlation results indicating information about the correlation of the successive approximately carrier-demodulated received signal fragments with ~~a~~ phase-shifted replicas ~~replica~~ of the code component and any remaining carrier component, wherein the successive approximately carrier-demodulated received signal

fragments are ~~set (304) is~~ formed using different possible offsets from a nominal carrier frequency~~ used to approximately carrier-demodulate the received signal fragment~~, and further wherein each element of the set (304) is provided as a phasor ($c_{p,m}$) having a phase and a magnitude; and

b) means (306), responsive to the set (304) of phasors ($c_{p,m}$), for selecting the phasor ($c_{p,m}$) having a magnitude distinguishing it from all the other elements ($c_{p,m}$) of the set (304), and determining the phase of the selected phasor ($c_{p,m}$), and for providing information about the carrier frequency based on the phase of the selected phasor ($c_{p,m}$).

7. (Currently amended) An apparatus as in claim 6, wherein the set (304) of correlation results is a matrix of correlation results, and further wherein the matrix of correlation results is spanned by an index (m) indicating an offset from a nominal carrier frequency and also by an index (p) indicating a replica code phase, and still further wherein the selected phasor ($c_{p,m}$) is the phasor having the maximum magnitude of all the elements of the set (304).

8. (Currently amended) An apparatus as in claim 7, wherein the means for providing the matrix of correlation results includes means (31), responsive to a series of received signal fragments, for performing a coherent integration of each of the series of received signal fragments, and also means (32), responsive to the coherent integrations, for providing a non-coherent integration in which ~~the~~ phasor results of the coherent integrations are combined without regard to phase.

9. (Currently amended) An apparatus as in claim 8, wherein the means (32) for performing the non-coherent integration multiplies each element of a matrix of correlation results provided using a coherent integration of a first received signal fragment, by the complex conjugate of a corresponding element for an immediately

preceding received signal fragment.

10. (Original) An apparatus as in claim 7, wherein in providing the matrix of correlation results as phasor values ($c_{p,m}$) and in determining the phase of the phasor having the maximum magnitude of all the elements of the matrix, only at most two phasor values ($c_{p,m}$) are held in a memory device at any instant of time, and of the two phasor values, only the phasor value ($c_{p,m}$) having the larger magnitude is saved in the memory device before calculating a next phasor value ($c_{p,m}$).

11. (Currently amended) A system, including: a transmitter for transmitting a signal having a code component and a carrier component, and a ranging receiver for receiving the signal and for determining information about the carrier frequency of the signal, the ranging receiver characterized in that it comprises:

a) means (300), responsive to successive approximately carrier-demodulated received signal fragments (302), for providing a set (304) of correlation results indicating information about the correlation of the successive approximately carrier-demodulated received signal fragments with ~~a~~ phase shifted replicas ~~replica~~ of the code component and any remaining carrier component, wherein the successive approximately carrier-demodulated received signal fragments are ~~set (304) is~~ formed using different possible offsets from a nominal carrier frequency ~~used to approximately carrier-demodulate the received signal fragment~~, and further wherein each element of the set (304) is provided as a phasor ($c_{p,m}$) having a phase and a magnitude; and

b) means (306), responsive to the matrix (304) of phasors ($c_{p,m}$), for selecting the phasor ($c_{p,m}$) having a magnitude distinguishing it from all the other elements ($c_{p,m}$) of the set (304), and determining the phase of the selected phasor ($c_{p,m}$), and

for providing information about the carrier frequency based on the phase of the selected phasor ($c_{p,m}$).

12. (Currently amended) The system as in claim 11, further comprising a computing resource external to the ranging receiver, and wherein the apparatus communicates information to the computing ~~facility~~ resource via a wireless communication system and the computing ~~facility~~ resource provides at least some of the computation needed either to provide the set of correlation results or to determine the selected ~~select the~~ phasor ($c_{p,m}$).